

REMARKS

This response is submitted in reply to the Office Action dated December 18, 2008. Claims 1-18 currently stand rejected. Applicant respectfully traverses.

In light of the remarks presented below, Applicant respectfully requests reconsideration and allowance of all now-pending claims of the present application.

Claim Rejections - 35 USC § 103

Claims 1 and 10 currently stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito (U.S. Patent No. 6,728,226) in view of Sadri (U.S. Patent No. 6,621,808). Claims 2, 4, 6, 8, 11, 13, 15 and 17 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Tsunehara et al. (U.S. Patent No. 6,907,260, hereinafter "Tsunehara"). Claims 3 and 12 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Jin et al. (U.S. Patent Application Publication No. 2005/0159118, hereinafter "Jin"). Claims 5 and 14 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of O'Neill (U.S. Patent Application Publication No. 2006/0084379). Claims 7 and 16 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Catreux et al. (U.S. Patent Application Publication No. 2002/0183010, hereinafter "Catreux"). Claims 9 and 18 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Naito in view of Sadri and further in view of Otsuka et al. (U.S. Patent Application Publication No. 2005/0026614, hereinafter "Otsuka"). Applicants respectfully traverse.

The present application relates to an apparatus and a method for controlling downlink power of a complex cell in a centralized base station system based on remote radio frequency units. Thus, for example, in the downlink direction, all of the remote RF units in the complex cell transmit downlink signals to the same user equipment. For the remote RF unit farther from the UE, its transmitted signal contributes very small to the UE's downlink receiving signal power, and therefore is unnecessary (see page 7, lines 2-7 of the specification of the present application as filed). Thus, embodiments of the present application may weaken the contribution

to the downlink reception signal power of UE made by the remote RF units which are located relatively far away from the UE.

As recited in independent claim 1, an apparatus according to the claimed invention comprises signal quality measuring means connected to the RAKE receiver, for measuring signal quality of an uplink channel between each radio frequency unit and the same user equipment. The apparatus also includes average signal quality calculating means for calculating average signal quality of each uplink channel according to the measured signal quality and power control means for adjusting transmission power of the downlink channel corresponding to the uplink channel according to said average signal quality, so that the transmission power of the downlink channel corresponding to the uplink channel with a lower average signal quality is relatively lower. As such, the apparatus of independent claim 1 provides that the average signal quality of the uplink channel is adopted to determine the path loss of the downlink channel, so as to change the transmission power of the respective downlink channel. The principle is that the uplink and downlink path losses averaged over a period of time are mainly dependent on the spatial distance of the propagation path, they are approximately equal (see page 10, lines 2-5 of the specification of the present application as filed).

Naito discloses a multicast message communication system in which the object is to allow a relatively quick improvement in the quality of a multicast message transmitted from a base station to a plurality of specific mobile stations and to reduce the power consumption necessary for controlling the transmission powers of mobile stations (see Naito column 6, lines 24-29). To solve this technical problem, Naito provides a transmission power increase request signal that is adopted to inform the base station whether the base station should increase the transmission power of the multicast messages. The base station adjusts the transmission power of the multicast signal according to the transmission power increase request signal transmitted by respective mobile stations. When the reception power of the multicast message received by the mobile station (i.e. the reception power in the downlink channel) is lower than a threshold value, the transmission power of transmission power increase request signal is increased (but if the transmission power increase request signal has already reach a certain level, its transmission power will not be increased). The base station increases the transmission power of the multicast

signal in response to reception of the transmission power increase request signal being greater than a second threshold value. On the other hand, when the reception power of the multicast message received by the mobile station (i.e. the reception power in the downlink channel) is greater than the threshold value, the transmission power of transmission power increase request signal is decreased. The base station decreases the transmission power of the multicast signal in response to reception of the transmission power increase request signal being lower than the second threshold value (see column 8, lines 28-39 and column 9, lines 17-44 of Naito).

Accordingly, by comparing the disclosure of Naito to the claimed invention, several differences between Naito and the claimed invention become apparent. In this regard, as an initial matter, Applicant respectfully notes that the technical problem addressed by the present application is to adjust the downlink transmission power of a plurality of RF units in base stations to the same UE while Naito aims to adjust downlink transmission power of one base station (i.e. one RF unit) to a plurality of UEs, which is contrary to the aim of the present application.

In addition to the differences in the technical problems addressed by the present application and Naito, the claimed invention as defined, for example, in independent claim 1 is distinct from Naito because independent claim 1 provides that transmission power of the downlink channel corresponding to the uplink channel is adjusted according to signal quality of an uplink channel between each radio frequency unit and the same user equipment. Meanwhile, Naito provides that though the transmission power increase request signal is in the uplink, it does not represent the signal quality of an uplink channel between each radio frequency unit and the user equipment. In fact, to the contrary, it represents the signal quality of the downlink channel, and is substantially changed with the reception power of the downlink channel. As known to those skilled in the art, in a bi-directional channel, the signal qualities in the uplink and downlink directions are positively correlated. Thus, when the average signal quality of the uplink channel received by the base station is high, the average signal quality of the downlink channel is correspondingly high, but the corresponding transmission power increase request signal transmitted by the mobile station will be weak. Therefore, the allegation in the Office Action

that a transmission power increase request signal transmitted by the mobile station is equivalent to the signal quality of an uplink channel is incorrect.

The failure of Naito to teach or suggest that transmission power of the downlink channel corresponding to the uplink channel is adjusted according to signal quality of an uplink channel between each radio frequency unit and the same user equipment as provided in independent claim 1 is further indicated by referring to the disclosure of Fig. 3 of the present application. In this regard, as shown in Fig. 3, there are several base stations in a complex cell. The transmission power of the downlink channel corresponding to the uplink channel with poor signal quality is lowered to suppress the transmission power of the base station located relatively far away from the mobile station. Meanwhile, it can be seen from Fig. 4B of Naito that the power of the transmission power increase request signal (shown as UPLINK in Fig. 4B) increases sometimes and decreases at other times, but the base station strengthens the transmission power of the downlink channel all the time. This is because in Naito, there is only one base station (as shown in Fig. 3), and the base station must ensure all the mobile stations in the range of multicast can receive the messages with a sufficient signal quality. Accordingly, the transmission power in Naito is increased more in order to cover a more distant mobile station and it is impossible to suppress the transmission power of the base station under the disclosure of Naito. Thus, Naito fails to teach or suggest that transmission power of the downlink channel corresponding to the uplink channel is adjusted according to signal quality of an uplink channel between each radio frequency unit and the same user equipment as provided in independent claim 1.

Independent claim 10 includes a similar recitation to that of independent claim 1 in relation to adjusting transmission power of the downlink channel corresponding to the uplink channel according to said average signal quality, so that the transmission power of the downlink channel corresponding to the uplink channel with a lower average signal quality is relatively lower and is therefore distinguished from Naito for at least the same reasons provided above for independent claim 1.

Sadri fails to cure the above noted deficiency of Naito and is not cited as such. In fact, Sadri relates to the prediction of power levels for each finger in a Rake receiver and is also not

related to downlink power control as provided in independent claims 1 and 10. Moreover, although the combination of Sadri and Naito does not meet the claimed invention, even if one were to assume that the respective disclosures of Sadri and Naito met the claimed invention (an assumption with which Applicant expressly disagrees), one of skill in the art would not have any reason to combine Sadri and Naito given that Sadri and Naito are related to completely different technical problems than that of the claimed invention, as indicated above.

The remaining references, namely Tsunchara, Jin, O'Neill, Catreux and Otsuka also fail to cure the above noted deficiencies of Sadri and Naito and are not cited as such. Since the cited references each fail to teach or suggest the above recited feature, any combination of the cited references also fails to teach or suggest the above recited feature of independent claims 1 and 10. Accordingly, independent claims 1 and 10 are patentable over the cited references. Claims 2-9 and 11-18 depend either directly or indirectly from respective ones of independent claims 1 and 10, and thus include all the recitations of their respective independent claims. Therefore, dependent claims 2-9 and 11-18 are patentable for at least those reasons given above for independent claims 1 and 10.

Accordingly, Applicant respectfully submits that the rejections of claims 1-18 are traversed.

CONCLUSION

In view of the remarks submitted above, it is respectfully submitted that the present claims are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present invention.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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**ELECTRONICALLY FILED USING THE EFS-WEB ELECTRONIC FILING SYSTEM OF THE UNITED STATES
PATENT & TRADEMARK OFFICE ON March 18, 2009.**

LEGAL02/31196500v1